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THE HISTORY OF EVOLUTION.

From the Greeks to Darwin: an Outline of the Development of the Evolution Idea. By Henry Fairfield Osborn, Sc.D., Da Costa Professor of Biology in Columbia College, &c. (New York: Macmillan and Co.)

THE object of this most interesting and useful work is to survey the last twenty-four centuries and bring together the thoughts—true and false—upon evolution. Examining and comparing the material which he has collected, the author concludes "that the influences of early upon later thought are greater than has been believed, that Darwin owes more even to the Greeks than we have ever recognised." In supporting this conclusion the author desires to give due credit to the earlier writers, but not to lower in any way the transcendant position occupied by Darwin. Indeed, so scrupulously fair is the treatment that the materials are thoroughly available to those who do not altogether follow the author in his conclusion. And many objections to the conclusion are most prominently brought forward. Thus the great interval between the beginning and the middle of the present century, when all continuity in evolutionary thought seemed to be broken, is described again and again. We read on page 12: "Perhaps the sharpest transition was at the close of the third period, in which a distinct anti-evolution school had sprung up and succeeded in firmly entrenching itself, so that Darwin and Wallace began the present era with some abruptness." Again, on pages 227 and 228, the strong prejudice against evolution which marks this period is illustrated in many ways, and the section concludes: ". . . all the progress which had been made in the long centuries we have been considering was, for the time, a latent force. The Evolution idea, with the numerous truths which had accumulated about it, was again almost wholly subordinate to the Special Creation idea."

The recognition of this strongly-marked gap in the history of evolutionary thought, and, above all, the details which we learn from Darwin's "Life and Letters," tend to throw doubt upon the view that he drew much of his inspiration from the past. The great majority of naturalists could not entertain the idea of evolution unless some explanation of its cause was forthcoming. Darwin treated the process and the cause as entirely distinct, and was convinced of the one long before he had come to any definite opinion about the other. In accepting evolution as against special creation, we fail to find any evidence that Darwin was influenced by the arguments or conclusions of an earlier day. He was influenced and finally convinced by his conclusions from his own observations on the *Beagle* (quoted by Prof. Osborn on p. 233). In looking for the causes of evolution he was equally independent of the past; for he saw that adaptation was the central fact which required explanation, and which had received none at the hands of the naturalists with whose writings he was acquainted.

But whether the thread be broken or continuous, the history of thought upon this all-important subject is of the deepest interest, and Prof. Osborn's work will be welcomed by all who take an intelligent interest in evolution. Up to the present, the pre-Darwinian evolutionists have been for the most part considered singly, the claims of particular naturalists being urged often with too warm an enthusiasm. Prof. Osborn has undertaken a more comprehensive work, and with well-balanced judgment assigns a place to every writer.

The history of thought upon evolution from 640 B.C. to the present day is divided into two main phases, the second of which is further subdivided into three periods.

The first phase, "The Anticipation of Nature: Greek Evolution," and its effects on Christian Theology and Arabic Philosophy, lasted from 640 B.C. to 1600 A.D.

The second phase, "The Interpretation of Nature: Modern Evolution," opens with the period of "Philosophical Evolution," from 1600 to 1800, associated with the names of Bacon, Kant, Herder, Bonnet, Oken, &c. In this period the Greek traditions were largely shaken off, and inductive evolution began.

The next period, that of the rise and decline of "Modern Inductive Evolution," somewhat overlapping the last, is limited by the years 1730 and 1850, from Buffon to St. Hilaire. It depends upon the writings of Linnæus, Erasmus Darwin, Lamarck, Goethe, Treviranus, &c. At the close of this period, Owen and Herbert Spencer are placed.

The last period, that of the re-establishment of "Modern Inductive Evolution" upon a firmer foundation, dates from 1858 to the present day. It is associated with the names of Darwin and Wallace, and marked by the scientific evidences of evolution, by the theory of natural selection, by observation and speculation upon other factors of evolution.

The section which deals with the Greeks has been somewhat unfairly criticised. Some people appear to believe that an account of Greek ideas upon evolution can only be attempted with success by an eminent classical scholar. But classical scholars have already done their utmost in the way of translation and of study. It is now of far greater importance to have a critical account, like that in the work we are considering, by a writer who is an authority upon evolution.

In discussing "The Legacy of the Greeks" (pp. 64-68) the author points out that the first element is "scientific curiosity, their desire to find a natural explanation for the origin and existence of things." The complete dependence of all investigation upon this spirit is maintained, and it is truly said that "the ground motive in science is a high order of curiosity, led on by ambition to overcome obstacles." The final conclusion is that "the Greeks left the later world face to face with the problem of causation in three forms: first, whether intelligent design is constantly operating in nature; second, whether nature is under the operation of natural causes originally implanted by intelligent design; and third, whether nature is under the operation of natural causes due from the beginning to the laws of chance, and containing no evidences of design, even in their origin."

In this section of the work we find, as we might expect, that the genius of Aristotle completely overshadows that of the other Greek writers who attempted to face the problems of the origin and development of living forms.

In the long second period, that of the theologians and natural philosophers, "no advance whatever in the development of the evolution idea was made . . . ; scientific speculation and observation were at a standstill, except among the Arabs" (p. 70).

As we advance towards the work of the naturalists and philosophers of the two last centuries, the difficulties and dangers of interpretation increase. It is even easier to read preconceived notions into the single passages of dead writers than into the phenomena of nature; and we all know that the latter process is only too easy. If the results are not to be in the highest degree misleading, the author must, like Prof. Osborn, be entirely free from bias, and must possess a cool and critical judgment.

We meet with constant and timely protests against the rash conclusions which may be reached by selecting isolated passages from an author, and dealing with them apart from their context, and the full recognition of the great danger which underlies this too common practice, viz. that we unconsciously read into such passages our present knowledge (p. 80).

Prof. Osborn considers that too high a place has been assigned to Oken and Treviranus by Haeckel and Huxley respectively, and that Naudin's supposed anticipation of natural selection is far from being as satisfactory as Quatrefages and Varigny maintain. The suggestion that Oken anticipated the cell theory is acutely criticised: it is suggested that his conception of the cell as a sphere was probably only a result of the transcendant position occupied by this geometrical form in his system of philosophy (p. 124).

The suggestion (on p. 235) that Darwin's 1844 Essay should be published will, the present writer feels assured, meet with warm approval from the wide circle of readers who are eager to learn all that can be learnt of the history of Darwin's views upon the great work of his life.

The hope is expressed (on p. 245) that we shall learn the steps which led to Wallace's independent discovery of natural selection. That information is fortunately now before us, and we know that Wallace was led to the discovery by reflecting on Malthus' "Essay on Population," as he lay ill of intermittent fever at Ternate (quoted, without reference, in Milnes Marshall's "Lectures on the Darwinian Theory," London, 1894, pp. 212, 213, and to be found in the abridged form of the "Life and Letters of Charles Darwin"). Thus another most important detail is added to the extraordinary coincidence of the independent discovery of natural selection.

There is comparatively little to criticise in the volume.

The idea of the marine origin of life, traced to Thales, is stated to be "now a fundamental principle of evolution" (p. 33); but at the end of the volume it is more correctly asserted that we are now too wise to answer the inquiry: Where did life first appear? (p. 247).

Concerning the debated question as to whether Lamarck was aware of Erasmus Darwin's writings, and made use of them without acknowledgment, the author (pp. 154, 155) quotes a passage from the "Animaux sans Vertébres," in which Lamarck states that his theory is the first which has been presented. This he considers to be "satisfactory evidence that Erasmus Darwin and Lamarck independently evolved their views." But if Lamarck borrowed without acknowledgment, it would be but a small step further to write the passage in question.

The statements and conclusions to which exception is chiefly to be taken concern the life of Darwin himself, which the author professedly treats in a very brief and imperfect manner, any detailed account being beyond the scope of this volume.

The author speaks (p. 227) of "Huxley's somewhat guarded acceptance of the theory" on the first appearance of the "Origin," and implies that he became a much stronger supporter of evolution in later years. But in reality his convictions on this subject never changed. In his letter to Darwin, written November 23, 1859, the day before the publication of the "Origin," Huxley expressed himself as "prepared to go to the stake, if requisite, in support of" those parts of the book which deal with evolution as apart from natural selection. As to the latter he says: "I think you have demonstrated a true cause for the production of species, and have thrown the *onus probandi* that species did not arise in the way you suppose, on your adversaries." And these were Huxley's views up to the last occasions on which he spoke on the subject, at the Oxford meeting of the British Association last year, and at the anniversary of the Royal Society when he received the Darwin Medal. On both occasions he carefully distinguished between evolution and natural selection, being prepared to defend the former to the uttermost, while he declined to commit himself upon the latter.

It is contended (p. 239) that Darwin's faith in natural selection reached its climax in 1858, and then gradually declined. The evidence quoted in support of this conclusion is a letter to Carus in 1869, in which Darwin says: "I have been led to infer that single variations are of even less importance in comparison with individual differences than I formerly thought." But this passage proves a strengthening, and not a weakening of his belief in the efficiency of natural selection, inasmuch as it is considered competent to work upon the minute differences which separate individuals instead of upon the ready-made material provided by single variations, however conspicuous. By "single variations" he meant single individuals differing widely and conspicuously from the average of their species. His letter to Carus was written shortly after he had been convinced on this point by Fleeming Jenkin's review of the "Origin" (*North British Review*, June 1867). A careful study of vol. iii. of the "Life and Letters" leaves no doubt upon this point; while the facts thus brought out tend to refute the argument on p. 245 as to the supposed antagonism between Darwin's and Wallace's conception of the operation of natural selection as expressed in their contributions to the Linnean Society in 1858.

A passage in the sixth edition of the "Origin" is referred to (p. 242) as having been published in 1880, and is therefore considered to be "among Darwin's last words upon the factors of evolution." The passage in question is referred to p. 424 of the "Origin," but occurs on p. 421 of the copies I have consulted. In it Darwin expresses his belief that evolution has been effected "chiefly" by natural selection, "aided in an important manner by the inherited effects of use and disuse of parts; and in an unimportant manner . . . by the direct action of external conditions . . ." This passage is considered by Osborn to prove that the progressive tendency towards the explanations of Lamarck and Buffon which he believes Darwin exhibited from 1859 onwards—culminated at the close of his life. But the sixth edition appeared in 1872, and the date 1880 is merely that of a reprint. The words in question were certainly written before the former date, and even in the fifth edition (1869) Darwin inserted the word "chiefly" to qualify an expression of confidence which might have been interpreted as a belief in the all-sufficiency of natural selection.

The fact appears to be that there was no progressive change in Darwin's attitude on this subject, but that his opinion fluctuated as various classes of evidence were brought before him, and at the very end of his life his belief in the direct action of external conditions was seriously shaken by the results of Hoffmann's experiments. The effect produced on him is well shown in his letter to Semper, written July 19, 1881, less than a year before his death ("Life and Letters," vol. iii.). But although Darwin's opinion fluctuated as to the relative value of the supposed causes of evolution other than natural selection, his views as to the paramount importance of the latter never varied in any of his published utterances. The words which conclude the Introduction of the 1859 "Origin" are repeated without change in each succeeding edition and reprint. "Furthermore, I am convinced that natural selection has been the main, but not the exclusive means of modification."

The printing and general get-up of this interesting work leaves nothing to be desired, being far above the average that obtains in scientific publications. It may confidently be predicted that the book will be widely read and greatly appreciated. E. B. P.

THE ELEMENTS OF ARCHITECTURE.

Architecture for General Readers, &c. By H. Heathcote Statham. 8vo. (London: Chapman and Hall, 1895.)

THE aim of this treatise, as stated in the preface, is certainly a good one, namely, to supply the "general reader" with the means of criticising architecture in an intelligent manner, and principally by giving an analysis of the two most logical and complete styles that have ever existed, namely, the Greek and the Gothic; the former representing the trabeated, and the latter the arcuate system of building. Our author, however, very properly does not confine his attention to these two styles and their later developments, but also makes wide digressions in the direction of Egyptian, Byzantine, and Mahommedan structures, all of them being copiously illustrated and discussed at considerable length. The work exhibits throughout the author's great and varied acquaintance with his subject, and cannot but be of much interest and value to any reader who desires to dive more deeply than amateurs are accustomed to do into the principles which ought to guide the professional architect, and which, indeed, do guide all those who achieve anything worthy of the art in which they practise.

In page 20 the importance of planning is properly insisted on. The plan is shown to be the very "backbone" of the structure, and the attention of the "general reader" is rightly called to this. It may be doubted, however, whether the general reader is prepared for the minute criticism, which we find a little further on, respecting certain competition designs, which criticism is rendered the more difficult to follow, in consequence of the small scale of the plans by which these designs are illustrated, and he may, perhaps, wish that he had been led into such deep water more gently. In page 31, with reference to the proportions of buildings as affecting the eye, the author appears to doubt whether—with the exception of the late Mr. W. W. Lloyd's discovery of the system which prevails in the Parthenon—any definite and clear case has been made out for the establishment of proportion theories. The author is probably quite justified in his refusal to accept any general adoption of a system for proportioning buildings "on the basis of geometrical figures, especially triangles of various angles." There could not possibly be any æsthetic value in confining the main lines of the architecture within such limits; but rectangular proportions in low numbers (of which nature are the proportions of the Parthenon) are on a different footing, and it is extremely probable that they do produce harmonious effects. They are to be found in many other Greek examples besides the Parthenon, and in one Gothic building at least, namely, the work of Bishop Grosetete in the nave of Lincoln Cathedral (see the *Transactions* of the Archæological Institute of Great Britain, &c., for 1848), where rectangular proportions of this character come out without any "coaxing" with remarkable exactness; and as Bishop Grosetete, besides being a great ecclesiastic, was one of the most prominent philosophers of his day, there is the more reason to accept it as having been intentional.

In p. 34, the chief characteristics of the Egyptian, the Greek and the Gothic are summed up in a few words, as Mystery, Rationalism, and Aspiration. In p. 43, the meed of merited praise is given to Mr. E. L. Garbett's excellent little treatise on "The Principles of Design in Architecture." In p. 58, doubt is thrown on the wooden origin of the Greek entablature. The reader, however, may be referred to MM. Perrot and Chipiez' recent work on "The Arts of Primitive Greece," in which this derivation is shown from the remains at Tiryns, Mycenæ, and Orchomenus. In p. 73, the Corinthian example of the temple of Jupiter Olympius at Athens should not be attributed to a Roman source; it dates from Antiochus Epiphanes, the Greek founder, and the prototype of the capital is found in the *tholos* at Epidaurus, a pure Greek building. No doubt at the time the Athenian temple was built, about 170 B.C., Rome was pushing her way towards the East, and Antiochus himself had been sent as a hostage to Rome after the defeat of his father by Scipio. There may have been something political in his employment, as we are told of a Roman citizen as his architect, but the architecture itself, at that date, could not but have been thoroughly Greek.

In p. 78, the author well illustrates his argument, showing the superiority of constructive simplicity in a design over another decorated with meaningless architectural detail, by the contrast of London and Blackfriars Bridges; but it is not so clear, as maintained in the previous page that the combination of columnar and arcuate design in the same wall is a "Roman sham." It is no doubt a